

WHAT IS CLAIMED IS:

1. A digital camera that creates an image signal through catching a subject light, the digital camera comprising:
  - an image taking lens, which is variable in a focal length, comprising three groups of a first lens group, a second lens group, and a third lens group in the named order with respect to an optical axis direction;
  - a lens barrel that incorporates therein the image taking lens, having in front an aperture through which the image taking lens appears and having in rear an internal space defined by a wall, the lens barrel being free in extension and collapse and performing a focal length control; and
  - a solid state imaging device that receives the subject light formed by the image taking lens to create the image signal, the solid state imaging device being disposed at a position projecting from the wall to the internal space and being supported by the wall,
- wherein the lens barrel has a lens advancing and saving mechanism in which at the time of the collapse of the lens barrel, the second lens group is saved to a hollow portion divided by the solid state imaging device and the wall beside the solid state imaging device, the hollow portion being formed by the fact that the solid state imaging device is disposed at the position projecting from

the wall, and at the time of the extension of the lens barrel, the second lens group is advanced onto an optical axis of the image taking lens.

5           2. A digital camera according to claim 1, wherein the digital camera further comprises a focusing mechanism wherein a focusing is performed by a movement of the third lens group in the optical axis direction.

10           3. A digital camera according to claim 1, wherein the lens barrel has a second lens group guide frame that moves in the optical axis direction in accordance with the extension and the collapse so as to determine a position related to the optical axis direction of the second lens  
15 group, and a second lens group holding frame that holds the second lens group and is pivotally supported by the second lens group guide frame, the second lens group holding frame causing the second lens group to revolve on the optical axis of the image taking lens at the time of the extension,  
20 and the second lens group holding frame causing the second lens group to revolve on the hollow portion at the time of the collapse.

          4. A digital camera according to claim 3, wherein  
25 the second lens group holding frame is enabled in a direction that the second lens group is revolved on the optical axis,

the wall has a revolving affecting section having  
a geometry projecting into the internal space, the  
revolving affecting section being in contact with the  
second lens group holding frame at the time of the collapse  
5 to affect revolving of the rear elements holding frame, and

the second lens group holding frame has an affect  
receiving section that is pushed by the revolving effecting  
section at the time of the collapse so that the second lens  
group revolves into the hollow portion.

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5. A digital camera according to claim 4, wherein  
the second lens group holding frame causes the second lens  
group to advance onto the optical axis of the image taking  
lens by affect of the enabling, at the time of the  
15 extension, in such a manner that the affect receiving  
section is separated from the revolving affecting section.

6. A digital camera according to claim 4, wherein  
the revolving affecting section has a taper on the top, and  
20 the affect receiving section causes the second  
lens group to be saved from the optical axis of the image  
taking lens to the hollow portion through revolving by  
means of pushing by the taper of the revolving affecting  
section, at the time of the collapse.

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7. A digital camera according to claim 3, wherein  
the second lens group holding frame is enabled in a

direction that the second lens group is revolved on the optical axis,

the lens barrel has a cylinder that rotatably moves in accordance with the extension, the collapse and the focal length control, and the cylinder has a revolving affecting section being in contact with the second lens group holding frame by a rotatable movement of the cylinder at the time of the collapse to affect revolving of the second lens group holding frame, and

the second lens group holding frame has an affect receiving section that is pushed by the revolving effecting section at the time of the collapse so that the second lens group revolves into the hollow portion.

8. A digital camera according to claim 7, wherein the second lens group holding frame causes the second lens group to advance onto the optical axis of the image taking lens, at the time of the extension, in such a manner that the second lens group holding frame is released from urging of the revolving affecting section.

9. A digital camera according to claim 7, wherein the revolving affecting section has a projection provided at the rear end of the cylinder with respect to the optical axis direction, and

the affect receiving section causes the second lens group to be saved from the optical axis of the image

taking lens to the hollow portion through revolving by means of pushing by the taper of the revolving affecting section, at the time of the collapse.

5           10. A digital camera according to claim 3, wherein the digital camera further comprises a driving source that rotatably moves the second lens group holding frame so that the second lens group revolves.

10           11. A digital camera according to claim 10, wherein the driving source is a motor, and  
            the second lens group holding frame has a gear for transmitting a driving force from the motor.

15           12. A digital camera according to claim 1, wherein the digital camera further comprises a light quantity control member that moves in one united body together with the second lens group in the optical axis direction of the image taking lens stored in the lens  
20           barrel to control a light quantity of the subject light passing through the image taking lens, and  
            the lens advancing and saving mechanism provides such a performance that at the time of the collapse of the lens barrel, the light quantity control member is saved  
25           together with the second lens group to the hollow portion, and at the time of the extension of the lens barrel, the light quantity control member is advanced together with the

second lens group onto the optical axis of the image taking lens.

13. A digital camera according to claim 12,  
5 wherein the light quantity control member consists of an electrooptical element.

14. A digital camera according to claim 12,  
wherein the light quantity control member is an aperture  
10 member that controls an aperture caliber to control the subject light passing through the image taking lens.

15. A digital camera according to claim 13,  
wherein the light quantity control member is an aperture  
15 member that controls an aperture caliber to control the subject light passing through the image taking lens.

16. A digital camera according to claim 12,  
wherein the light quantity control member is a shutter  
20 member that controls a shutter speed to control the subject light passing through the image taking lens.

17. A digital camera according to claim 13,  
wherein the light quantity control member is a shutter  
25 member that controls a shutter speed to control the subject light passing through the image taking lens.

18. A digital camera that creates an image signal through catching a subject light, the digital camera comprising:

an image taking lens, which is variable in a focal  
5 length, comprising three groups of a first lens group, a  
second lens group, and a third lens group in the named  
order with respect to an optical axis direction;

a lens barrel that incorporates therein the image  
taking lens, having in front an aperture through which the  
10 image taking lens appears and having in rear an internal  
space defined by a wall, the lens barrel being free in  
extension and collapse and performing a focal length  
control; and

a solid state imaging device that receives the  
15 subject light formed by the image taking lens to create the  
image signal, the solid state imaging device being  
supported by the wall,

wherein the lens barrel has a second lens group  
guide frame that moves in the optical axis direction in  
20 accordance with the extension and the collapse so as to  
determine a position related to the optical axis direction  
of the second lens group, and a second lens group holding  
frame that holds the second lens group and is pivotally  
supported by the second lens group guide frame, the second  
25 lens group holding frame causing the second lens group to  
revolve on the optical axis of the image taking lens at the  
time of the extension, and the second lens group holding

frame causing the second lens group to revolve on a saving position out of the optical axis of the image taking lens at the time of the collapse.

5           19. A digital camera according to claim 18, wherein the digital camera further comprises a focusing mechanism wherein a focusing is performed by a movement of the third lens group in the optical axis direction.

10           20. A digital camera according to claim 18, wherein the second lens group holding frame is enabled in a direction that the second lens group is revolved on the optical axis,

            the wall has a revolving affecting section having  
15 a geometry projecting into the internal space, the revolving affecting section being in contact with the second lens group holding frame at the time of the collapse to affect revolving of the second lens group holding frame, and

20           the second lens group holding frame has an affect receiving section that is pushed by the revolving effecting section at the time of the collapse so that the second lens group revolves into the saving position.

25           21. A digital camera according to claim 20, wherein the second lens group holding frame causes the second lens group to advance onto the optical axis of the



image taking lens by affect of the enabling, at the time of the extension, in such a manner that the affect receiving section is separated from the revolving affecting section.

5           22. A digital camera according to claim 20, wherein the revolving affecting section has a taper on the top, and

          the affect receiving section causes the second lens group to be saved from the optical axis of the image taking lens to the saving position through revolving by  
10       means of pushing by the taper of the revolving affecting section, at the time of the collapse.

          23. A digital camera according to claim 18, wherein the second lens group holding frame is enabled in a direction that the second lens group is revolved on the optical axis,

          the lens barrel has a cylinder that rotatably moves in accordance with the extension and the collapse, and the cylinder has a revolving affecting section being in  
20       contact with the second lens group holding frame by a rotatable movement of the cylinder at the time of the collapse to affect revolving of the second lens group holding frame, and

25           the second lens group holding frame has an affect receiving section that is pushed by the revolving effecting section at the time of the collapse so that the second lens

group revolves into the saving position.

24. A digital camera according to claim 23,  
wherein the second lens group holding frame causes the  
5 second lens group to advance onto the optical axis of the  
image taking lens, at the time of the extension, in such a  
manner that the second lens group holding frame is released  
from urging of the revolving affecting section.

10 25. A digital camera according to claim 23,  
wherein the revolving affecting section has a projection  
provided at the rear end of the cylinder with respect to  
the optical axis direction, and

the affect receiving section causes the second  
15 lens group to be saved from the optical axis of the image  
taking lens to the saving position through revolving by  
means of pushing by the taper of the revolving affecting  
section, at the time of the collapse.

20 26. A digital camera according to claim 12,  
wherein the digital camera further comprises a driving  
source that rotatably moves the second lens group holding  
frame so that the second lens group revolves.

25 27. A digital camera according to claim 26,  
wherein the driving source is a motor, and  
the second lens group holding frame has a gear for

transmitting a driving force from the motor.

28. A digital camera that creates an image signal through catching a subject light, the digital camera comprising:

an image taking lens, which is variable in a focal length, comprising three groups of a front elements lens, a rear elements lens, and a focus lens in the named order with respect to an optical axis direction, wherein a focusing is performed by a movement of the focus lens;

a lens barrel that incorporates therein the image taking lens, having in front an aperture through which the image taking lens appears and having in rear an internal space defined by a wall, the lens barrel being free in extension and collapse and performing a focal length control; and

a solid state imaging device that receives the subject light formed by the image taking lens to create the image signal, the solid state imaging device being disposed at a position projecting from the wall to the internal space and being supported by the wall,

wherein the lens barrel has a lens advancing and saving mechanism in which at the time of the collapse of the lens barrel, the rear elements lens is saved to a hollow portion divided by the solid state imaging device and the wall beside the solid state imaging device, the hollow portion being formed by the fact that the solid

state imaging device is disposed at the position projecting from the wall, and at the time of the extension of the lens barrel, the rear elements lens is advanced onto an optical axis of the image taking lens.

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29. A digital camera according to claim 28, wherein the lens barrel has a rear elements guide frame that moves in the optical axis direction in accordance with the extension, the collapse and the focal length control so as to determine a position related to the optical axis direction of the rear elements lens, and a rear elements holding frame that holds the rear elements lens and is pivotally supported by the rear elements guide frame, the rear elements holding frame causing the rear elements lens to revolve on the optical axis of the image taking lens at the time of the extension, and the rear elements holding frame causing the rear elements lens to revolve on the hollow portion at the time of the collapse.

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30. A digital camera according to claim 29, wherein the rear elements holding frame is enabled in a direction that the rear elements lens is revolved on the optical axis,

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the wall has a revolving affecting section having a geometry projecting into the internal space, the revolving affecting section being in contact with the rear elements holding frame at the time of the collapse to

affect revolving of the rear elements holding frame, and  
the rear elements holding frame has an affect  
receiving section that is pushed by the revolving effecting  
section at the time of the collapse so that the rear  
5 elements lens revolves into the hollow portion.

31. A digital camera according to claim 29,  
wherein the rear elements holding frame is enabled in a  
direction that the rear elements lens is revolved on the  
10 optical axis,

the lens barrel has a cylinder that rotatably  
moves in accordance with the extension, the collapse and  
the focal length control, and the cylinder has a revolving  
affecting section being in contact with the rear elements  
15 holding frame by a rotatable movement of the cylinder at  
the time of the collapse to affect revolving of the rear  
elements holding frame, and

the rear elements holding frame has an affect  
receiving section that is pushed by the revolving effecting  
20 section at the time of the collapse so that the rear  
elements lens revolves into the hollow portion.

32. A digital camera according to claim 29,  
wherein the digital camera further comprises a driving  
25 source that rotatably moves the rear elements holding frame  
so that the rear elements lens revolves.

33. A digital camera according to claim 28,  
wherein the digital camera further comprises a light  
quantity control member that moves in one united body  
together with the rear elements lens in the optical axis  
5 direction of the image taking lens stored in the lens  
barrel to control a light quantity of the subject light  
passing through the image taking lens, and

the lens advancing and saving mechanism provides  
such a performance that at the time of the collapse of the  
10 lens barrel, the light quantity control member is saved  
together with the rear elements lens to the hollow portion,  
and at the time of the extension of the lens barrel, the  
light quantity control member is advanced together with the  
rear elements lens onto the optical axis of the image  
15 taking lens.

34. A digital camera that creates an image signal  
through catching a subject light, the digital camera  
comprising:

20 an image taking lens, which is variable in a focal  
length, comprising three groups of a front elements lens, a  
rear elements lens, and a focus lens in the named order  
with respect to an optical axis direction, wherein a  
focusing is performed by a movement of the focus lens;

25 a lens barrel that incorporates therein the image  
taking lens, having in front an aperture through which the  
image taking lens appears and having in rear an internal

space defined by a wall, the lens barrel being free in extension and collapse and performing a focal length control; and

a solid state imaging device that receives the subject light formed by the image taking lens to create the image signal, the solid state imaging device being supported by the wall,

wherein the lens barrel has a rear elements guide frame that moves in the optical axis direction in accordance with the extension, the collapse and the focal length control so as to determine a position related to the optical axis direction of the rear elements lens, and a rear elements holding frame that holds the rear elements lens and is pivotally supported by the rear elements guide frame, the rear elements holding frame causing the rear elements lens to revolve on the optical axis of the image taking lens at the time of the extension, and the rear elements holding frame causing the rear elements lens to revolve on a saving position out of the optical axis of the image taking lens at the time of the collapse.

35. A digital camera according to claim 34, wherein the rear elements holding frame is enabled in a direction that the rear elements lens is revolved on the optical axis,

the wall has a revolving affecting section having a geometry projecting into the internal space, the

revolving affecting section being in contact with the rear elements holding frame at the time of the collapse to affect revolving of the rear elements holding frame, and

the rear elements holding frame has an affect receiving section that is pushed by the revolving effecting section at the time of the collapse so that the rear elements lens revolves into the saving position.

36. A digital camera according to claim 34, wherein the rear elements holding frame is enabled in a direction that the rear elements lens is revolved on the optical axis,

the lens barrel has a cylinder that rotatably moves in accordance with the extension, the collapse and the focal length control, and the cylinder has a revolving affecting section being in contact with the rear elements holding frame by a rotatable movement of the cylinder at the time of the collapse to affect revolving of the rear elements holding frame, and

the rear elements holding frame has an affect receiving section that is pushed by the revolving effecting section at the time of the collapse so that the rear elements lens revolves into the hollow portion.

37. A digital camera according to claim 34, wherein the digital camera further comprises a driving source that rotatably moves the rear elements holding frame



so that the rear elements lens revolves.